

MOISTURE & DENSITY TEST

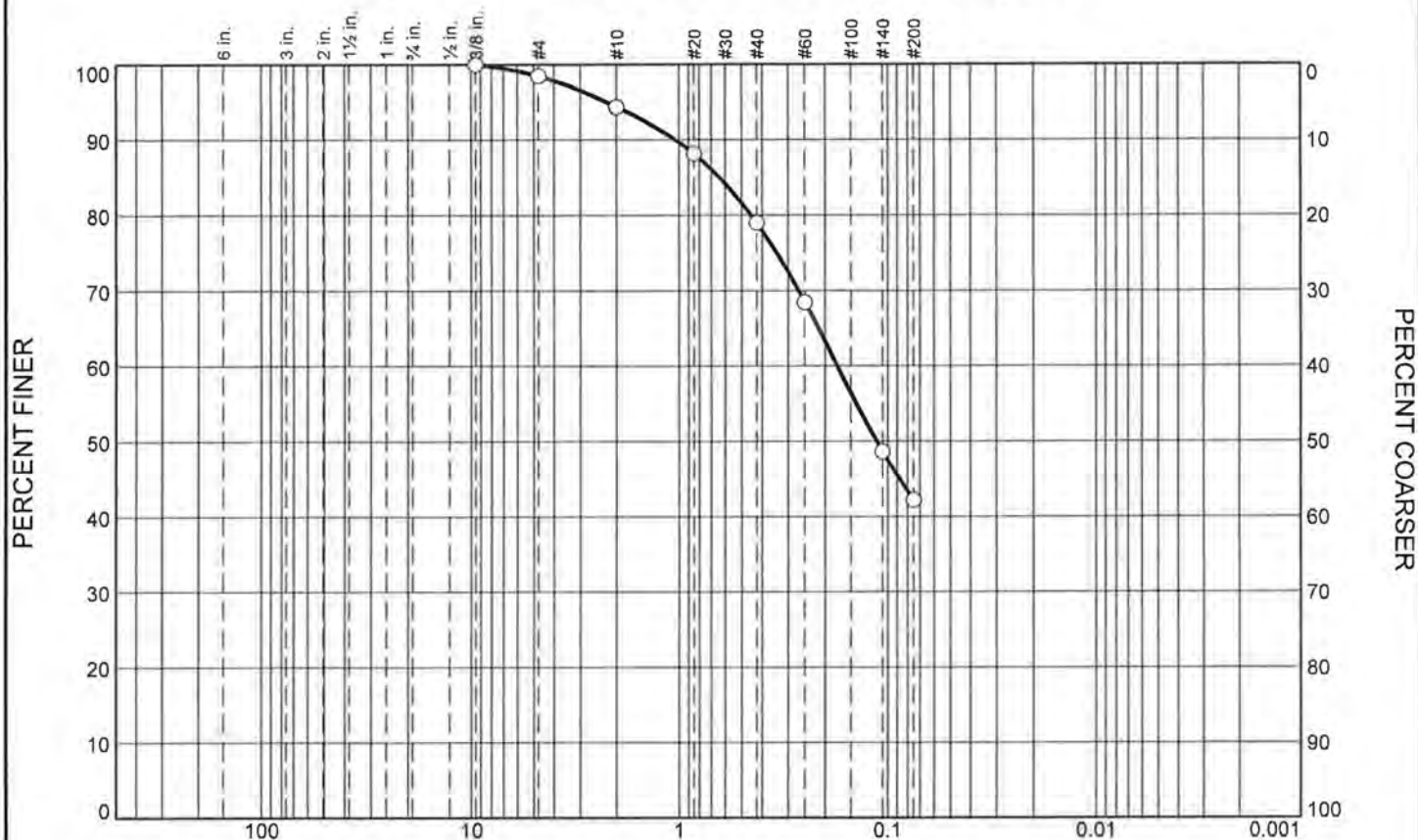
Client : URS/ARUP/HMM JV

Project : California High Speed Train

ISI Lab No.: G-52574
Job no : 2636-001.0

Boring #	S0067R	S0067R	S0067R	S0067R	S0067R	S0067R		
Sample #	MC04-2	MC12-2	SS19	MC26-2	MC28-2	SS31		
Depth (ft.)	15.5-16	50.5-51	81-81.5	110.5-111	120.9-121.4	136-136.5		
Soil type: (visual)	Olive brown sandy clay	Greenish gray silty clay with sand	Dark grayish green clay with sand	Greenish gray silty sand	Dark greenish gray sandy clay	Dark greenish gray lean clay with sand		
1. Date tested:	10/31/13	10/31/13	10/28/13	10/31/13	10/31/13	10/28/13		1.
2. Tested by:	JH	JH	JH	JH	JH	JH		2.
3. Specimen height (in.)	6.00	5.80		6.00	5.31			3.
4. Wt. of specimen + tare (gm)	894.96	882.63		874.24	828.76			4.
5. Tare wt. (gm)	0.00	0.00		0.00	0.00			5.
6. Diameter (in.)	2.40	2.39		2.41	2.41			6.
7. Wet wt. of soil + dish wt. (gm)	256.55	226.38	167.53	284.16	229.08	88.91		7.
8. Dry wt. of soil + dish wt. (gm)	211.68	192.80	144.55	232.20	200.11	77.91		8.
9. Wt. of dish (gm)	51.01	50.41	50.41	51.06	50.62	30.38		9.
10. Dish ID								10.
Wet Density (pcf)	125.5	129.1		121.6	130.2			
Dry Density (pcf)	98.1	104.5		94.5	109.1			
Moisture Content (%)	27.9	23.6	24.4	28.7	19.4	23.1		
Gs (Assumed)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Void Ratio	0.717	0.613		0.783	0.544			
Saturation (%)	105.1	103.9		98.9	96.1			
Additional data:								
Wt. of dry soil + dish before washing (gm)								
Wt. of dry soil + dish after washing (gm)								
% Passing # 200 sieve								
USCS symbol								

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	5	15	37	42	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100		
#4	99		
#10	94		
#20	88		
#40	79		
#60	68		
#140	49		
#200	42		

* (no specification provided)

Soil Description
Olive clayey sand

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 1.0420 D₈₅= 0.6400 D₆₀= 0.1749
 D₅₀= 0.1135 D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= AASHTO=

Remarks
 F.M.=1.02

Source of Sample: S0067R G-52574
Sample Number: U03

Depth: 11.5-12.5

Date: 10/31/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

Project No: 2636-001.0

Figure



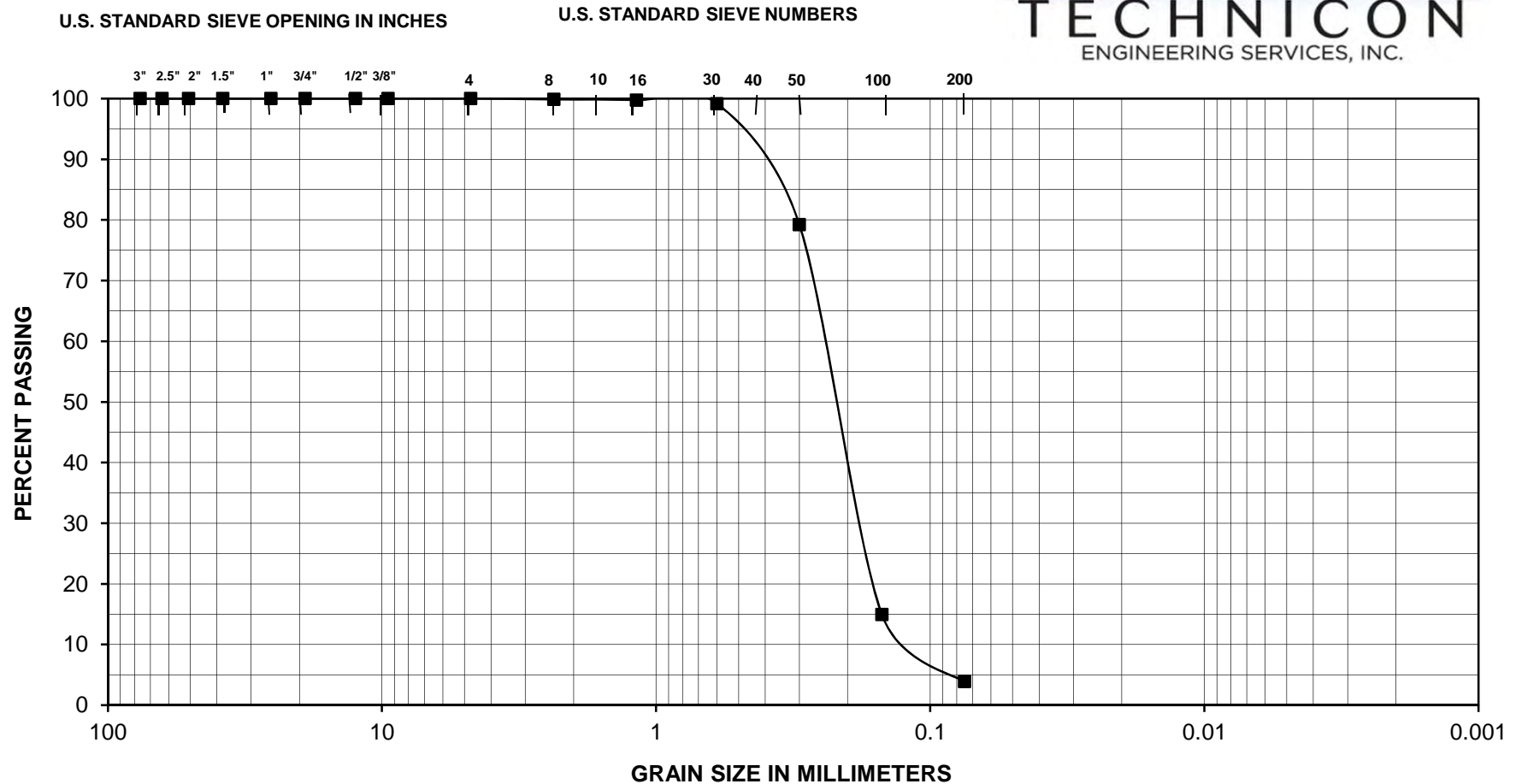
*Construction Testing & Inspection * Geotechnical & Environmental Engineering*

Sieve Analysis for Soil / Fine Aggregate ASTM C-136

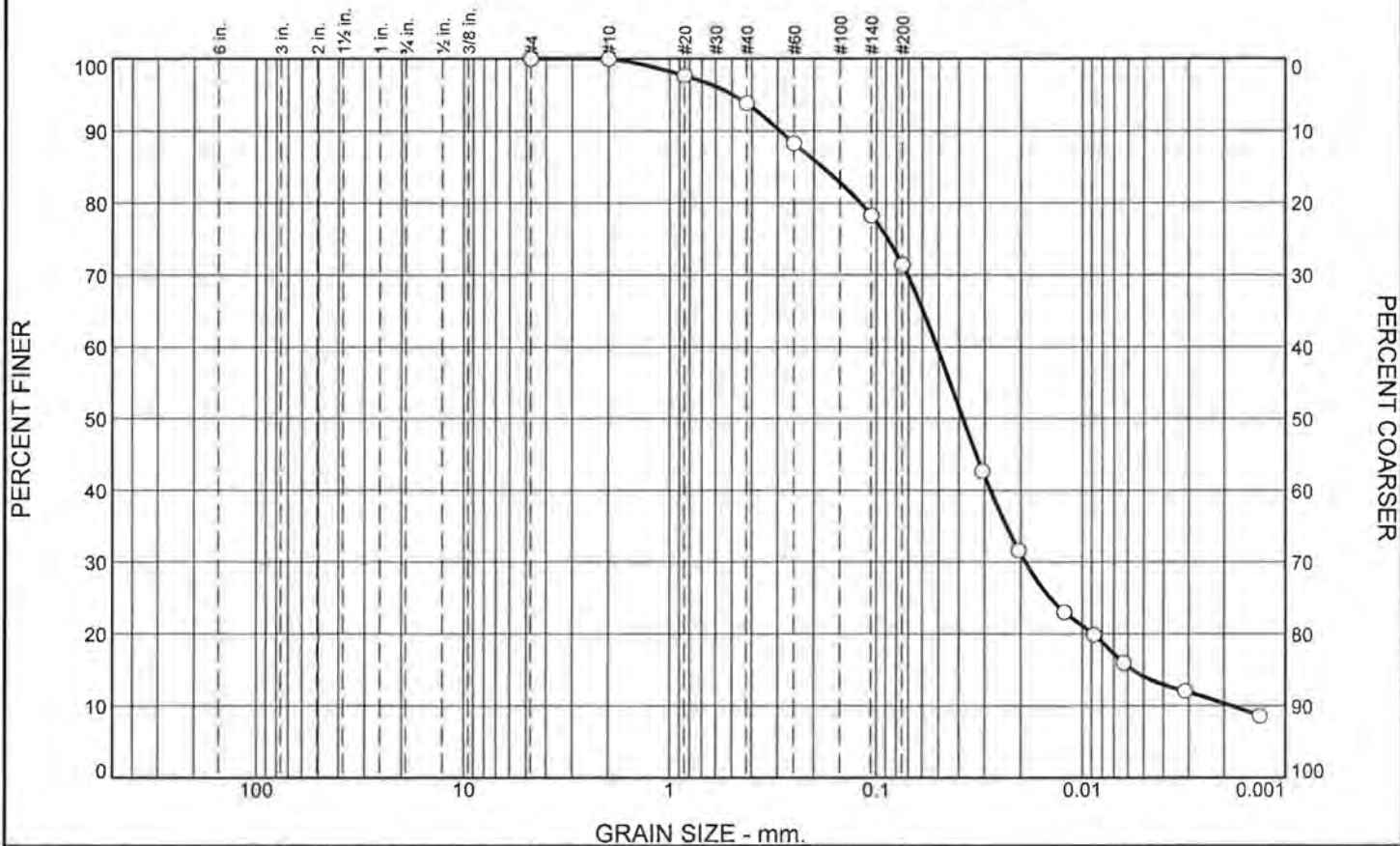
Project:	CA HSR	Technician:	K. Ford
		Date:	1/16/2014
TES#:	23502-ZS9	Sample No.:	MC06-1
Boring #:	S0067R; 25-26.5'	Classification:	(SP) Poorly Graded Sand

	Weight (lbs. or grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	169.4	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash	169.4	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	164.8	2"	44.0 (20.0)

Sieve Size	Cumulative Weight Retained	Individual Weights Retained	Cumulative % Retained	Cumulative % Passing	Specs.
3 in.			0.0	100.0	
2 1/2 in.			0.0	100.0	
2 in.			0.0	100.0	
1 1/2 in.			0.0	100.0	
1 in.			0.0	100.0	
3/4 in.			0.0	100.0	
1/2 in.			0.0	100.0	
3/8 in.			0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.2	0.2	0.1	99.9	
#16	0.4	0.2	0.2	99.8	
#30	1.4	1.0	0.8	99.2	
#50	35.2	33.8	20.8	79.2	
#100	144.1	108.9	85.1	14.9	
#200	162.8	18.7	96.1	3.9	
Pan	164.8				

[illegible]

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	6	23	57	14

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#10	100		
#20	98		
#40	94		
#60	88		
#140	78		
#200	71		
0.0308 mm.	43		
0.0205 mm.	32		
0.0125 mm.	23		
0.0088 mm.	20		
0.0063 mm.	16		
0.0031 mm.	12		
0.0013 mm.	9		

* (no specification provided)

Soil Description
Gray brown sandy silt

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.2924 D₈₅= 0.1826 D₆₀= 0.0512
 D₅₀= 0.0384 D₃₀= 0.0190 D₁₅= 0.0056
 D₁₀= 0.0018 C_u= 27.86 C_c= 3.84

Classification
 USCS= AASHTO=

Remarks
F.M.=0.32

Source of Sample: S0067R G-52574
Sample Number: SS09

Depth: 41.0-41.5

Date: 10/31/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

Project No: 2636-001.0

Figure

Tested By: JH/PH

Checked By: PH



Construction Testing & Inspection * Geotechnical & Environmental Engineering

Sieve Analysis for Soil and Fine Aggregate

Project:	CA HSR FRE_BAK	Technician:	K. Ford
TES#:	23502-ZS9	Date:	1/14/2014
Boring No.:	S0067R	Depth, ft	45-46.5'
Sample No.:	MC11-1	Classification:	(SM) Fine-Med Silty Sand

	Weight (grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	74.4	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Soil Before Wash	74.4	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Soil After Wash	64.9	2"	44.0 (20.0)

Sieve Size	Individual Weight Retained	Individual % Retained	Combined % Retained	Combined % Passing	Specs.
3 in.	0.0	0.0	0.0	100.0	
2 1/2 in.	0.0	0.0	0.0	100.0	
2 in.	0.0	0.0	0.0	100.0	
1 1/2 in.	0.0	0.0	0.0	100.0	
1 in.	0.0	0.0	0.0	100.0	
3/4 in.	0.0	0.0	0.0	100.0	
1/2 in.	0.0	0.0	0.0	100.0	
3/8 in.	0.0	0.0	0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.1	0.1	0.1	99.9	
#10	0.0	0.0	0.1	99.9	
#16	0.2	0.3	0.4	97.6	
#30	14.0	18.8	19.2	80.8	
#40	10.5	14.1	33.3	66.7	
#50	15.2	20.4	53.7	46.3	
#100	12.7	17.1	70.8	29.3	
#200	9.6	12.9	83.7	16.4	
Pan					

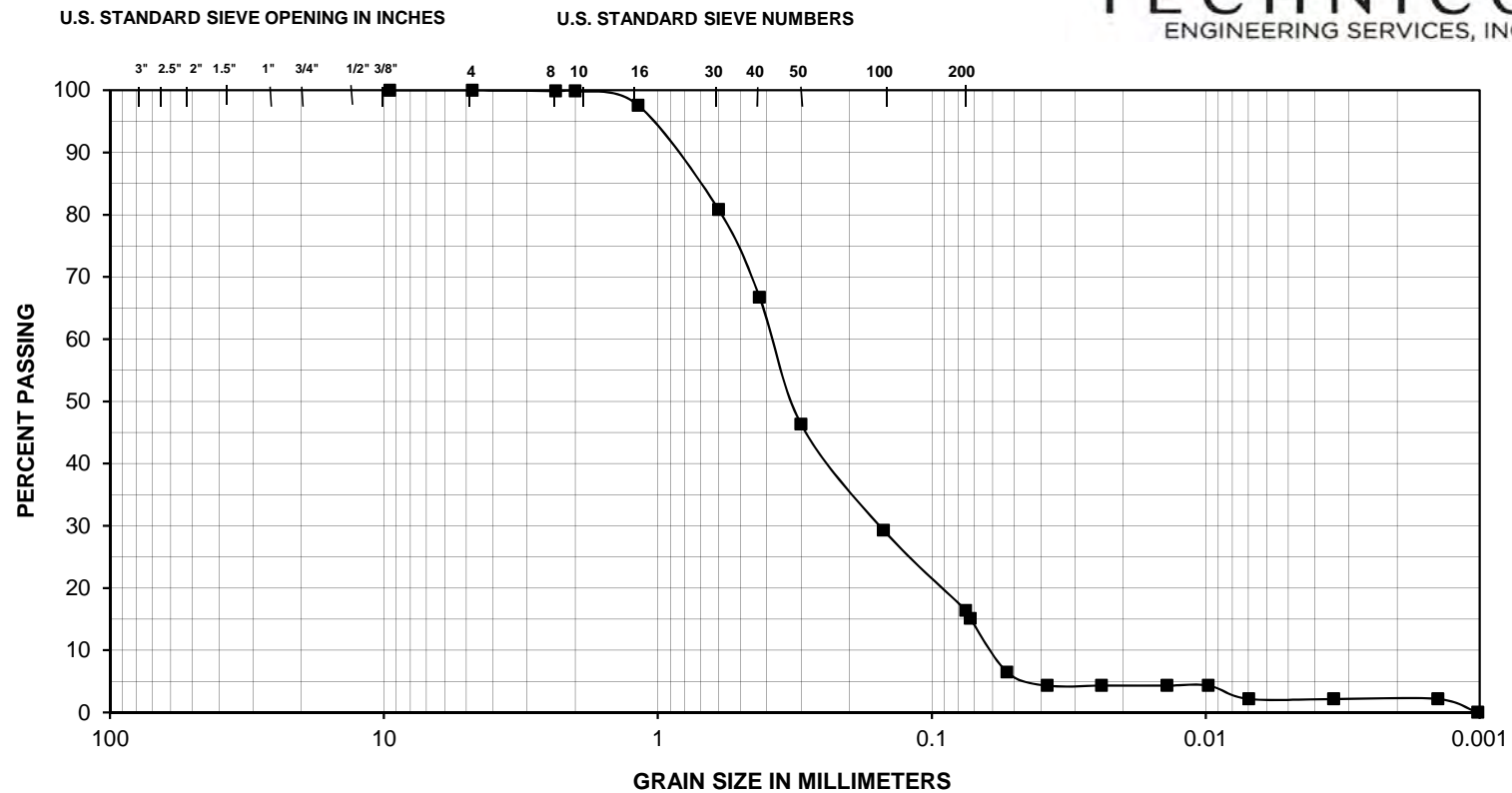


Construction Testing & Inspection * Geotechnical & Environmental Engineering

HYDROMETER TEST DATA SUMMARY

ASTM D 422-63

PROJECT:		CA HSR FRE_BAK				TES #: S0067R	
Boring Number		S0067R				DATE: 1/14/2014	
Sample Depth, ft		45-46.5'		Sample No.: MC11-1		TESTED BY: K. Ford	
Mass of Test Sample, g		75.00		"air-dried"		Hydrometer Type 151H	
Mass of Hygroscopic Sample, g		30.00		"air-dried"			
Mass of Hygroscopic Sample, g		29.77		"oven-dried"		Specific Gravity of Test Material 2.650	
Mass of Test Sample, g		74.43		"oven-dried"		Specific Gravity of Test Solution Varies	
Time (min.)	Hydrometer Reading	Corrected Reading	Temperature Degrees C	Effective Depth Table 2 (cm)	Constant, K Table 3	Diameter, D (mm)	Amt. Suspended, P (%)
0.5	1.009	1.007	21	14.4	0.01348	0.0723	15.1
1	1.005	1.003	21	15.5	0.01348	0.0531	6.5
2	1.004	1.002	21	15.8	0.01348	0.0379	4.3
5	1.004	1.002	21	15.8	0.01348	0.0240	4.3
15	1.004	1.002	21	15.8	0.01348	0.0138	4.3
30	1.004	1.002	21	15.8	0.01348	0.0098	4.3
60	1.003	1.001	21	16.0	0.01348	0.0070	2.2
250	1.003	1.001	21	16.0	0.01348	0.0034	2.2
1440	1.003	1.001	21	16.0	0.01348	0.0014	2.2
2880	1.002	1.000	21	16.3	0.01348	0.0010	0.0

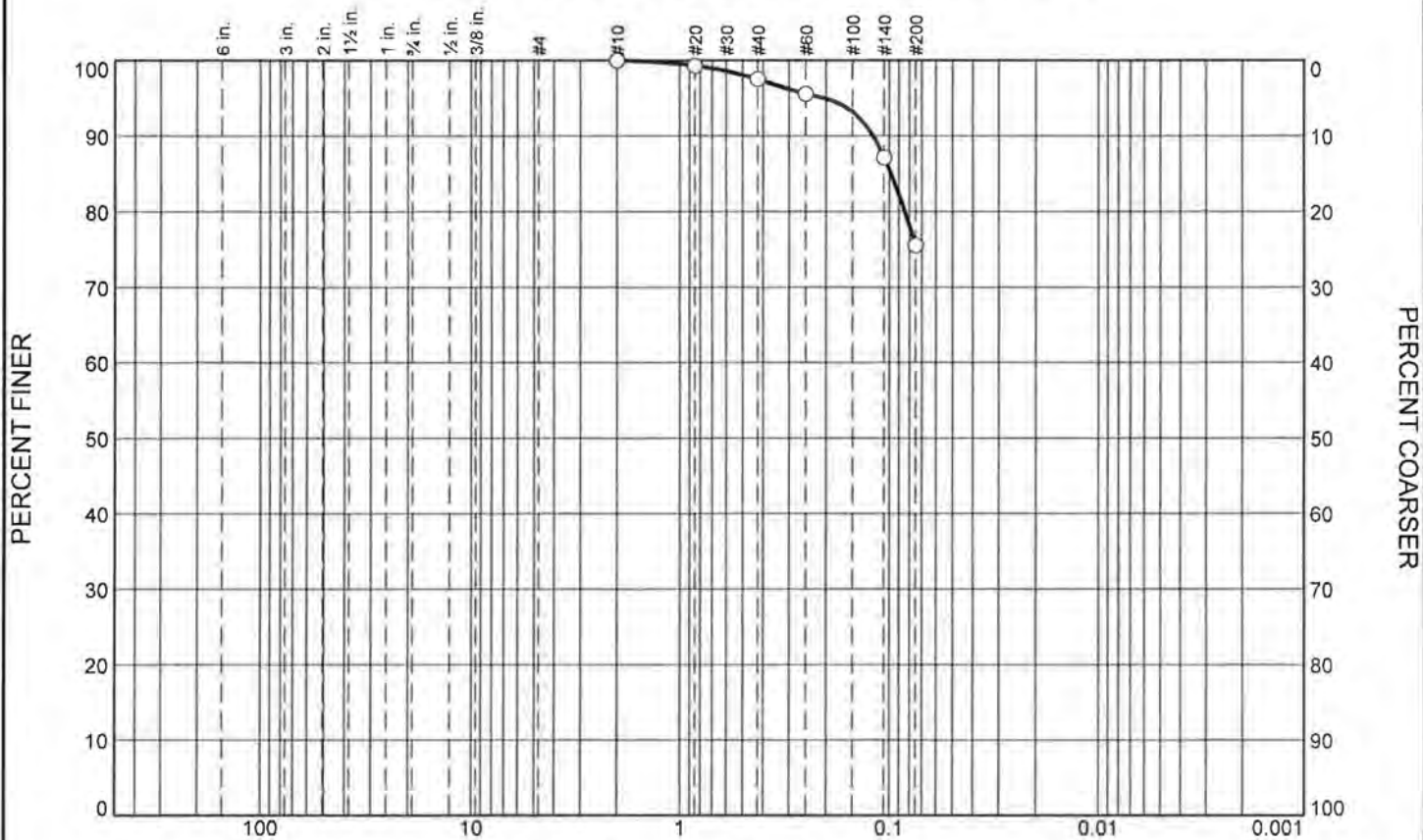


—■— 45-46.5'

Sample #	Classification	% Gravel	% Sand	% Silt	% Clay*	% Moist.	LL	PL	PI	Project:	CA HSR FRE_BAK
MC11-1	(SM) Fine-Med Silty Sand	0	83.7	14.2	2.1	0.8					
										TES#:	23502-ZS9
										Boring#:	S0067R
										Date:	1/14/2014

* Particles smaller than 5 Micron in diameter

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	2	22	76	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100		
#20	99		
#40	98		
#60	96		
#140	87		
#200	76		

* (no specification provided)

Soil Description
Greenish gray silty clay with sand

Atterberg Limits
 PL= 22 LL= 32 PI= 10

Coefficients
 D₉₀= 0.1199 D₈₅= 0.0982 D₆₀=
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= CL AASHTO= A-4(7)

Remarks
 F.M.=0.12

Source of Sample: S0067R G-52574
Sample Number: MC12-2

Depth: 50.5-51.0

Date: 10/31/13



Client: URS/ARUP/HMM JV
Project: California High Speed Train

Project No: 2636-001.0

Figure



*Construction Testing & Inspection * Geotechnical & Environmental Engineering*

Sieve Analysis for Soil and Fine Aggregate

Project:	CA HSR FRE_BAK	Technician:	K. Ford
TES#:	23502-ZS9	Date:	1/14/2014
Boring No.:	S0067R	Depth, ft	95-96.4'
Sample No.:	MC23-1	Classification:	(SM) Fine Silty Sand

	Weight (grams)	Maximum Sieve Size	Minimum Weight of Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	74.6	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Soil Before Wash	74.6	1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Soil After Wash	60.5	2"	44.0 (20.0)

Sieve Size	Individual Weight Retained	Individual % Retained	Combined % Retained	Combined % Passing	Specs.
3 in.	0.0	0.0	0.0	100.0	
2 1/2 in.	0.0	0.0	0.0	100.0	
2 in.	0.0	0.0	0.0	100.0	
1 1/2 in.	0.0	0.0	0.0	100.0	
1 in.	0.0	0.0	0.0	100.0	
3/4 in.	0.0	0.0	0.0	100.0	
1/2 in.	0.0	0.0	0.0	100.0	
3/8 in.	0.0	0.0	0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.0	0.0	0.0	100.0	
#10	0.0	0.0	0.0	100.0	
#16	0.2	0.3	0.3	99.3	
#30	3.8	5.1	5.4	94.6	
#40	3.2	4.3	9.6	90.4	
#50	5.3	7.1	16.8	83.2	
#100	17.8	23.9	40.6	59.4	
#200	23.7	31.8	72.4	27.6	
Pan					

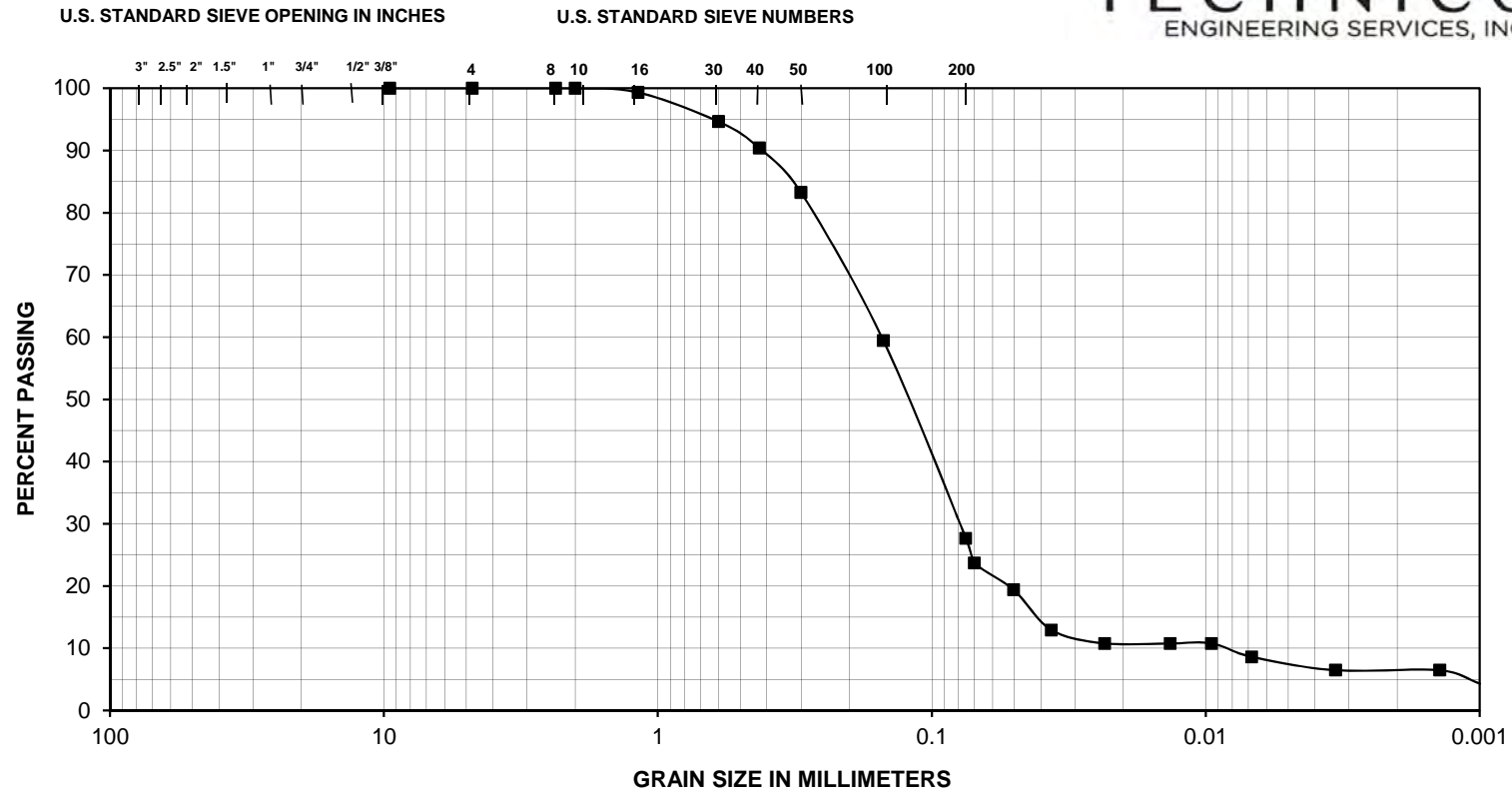


Construction Testing & Inspection * Geotechnical & Environmental Engineering

HYDROMETER TEST DATA SUMMARY

ASTM D 422-63

PROJECT:		CA HSR FRE_BAK				TES #: S0067R	
Boring Number		S0067R				DATE: 1/14/2014	
Sample Depth, ft		95-96.4'		Sample No.: MC23-1		TESTED BY: K. Ford	
Mass of Test Sample, g		75.00		"air-dried"		Hydrometer Type 151H	
Mass of Hygroscopic Sample, g		30.00		"air-dried"			
Mass of Hygroscopic Sample, g		29.85		"oven-dried"		Specific Gravity of Test Material 2.650	
Mass of Test Sample, g		74.63		"oven-dried"		Specific Gravity of Test Solution Varies	
Time (min.)	Hydrometer Reading	Corrected Reading	Temperature Degrees C	Effective Depth Table 2 (cm)	Constant, K Table 3	Diameter, D (mm)	Amt. Suspended, P (%)
0.5	1.013	1.011	21	13.4	0.01348	0.0698	23.7
1	1.011	1.009	21	13.9	0.01348	0.0503	19.4
2	1.008	1.006	21	14.7	0.01348	0.0365	12.9
5	1.007	1.005	21	15.0	0.01348	0.0233	10.8
15	1.007	1.005	21	15.0	0.01348	0.0135	10.8
30	1.007	1.005	21	15.0	0.01348	0.0095	10.8
60	1.006	1.004	21	15.2	0.01348	0.0068	8.6
250	1.005	1.003	21	15.5	0.01348	0.0034	6.5
1440	1.005	1.003	21	15.5	0.01348	0.0014	6.5
2880	1.004	1.002	21	15.8	0.01348	0.0010	4.3

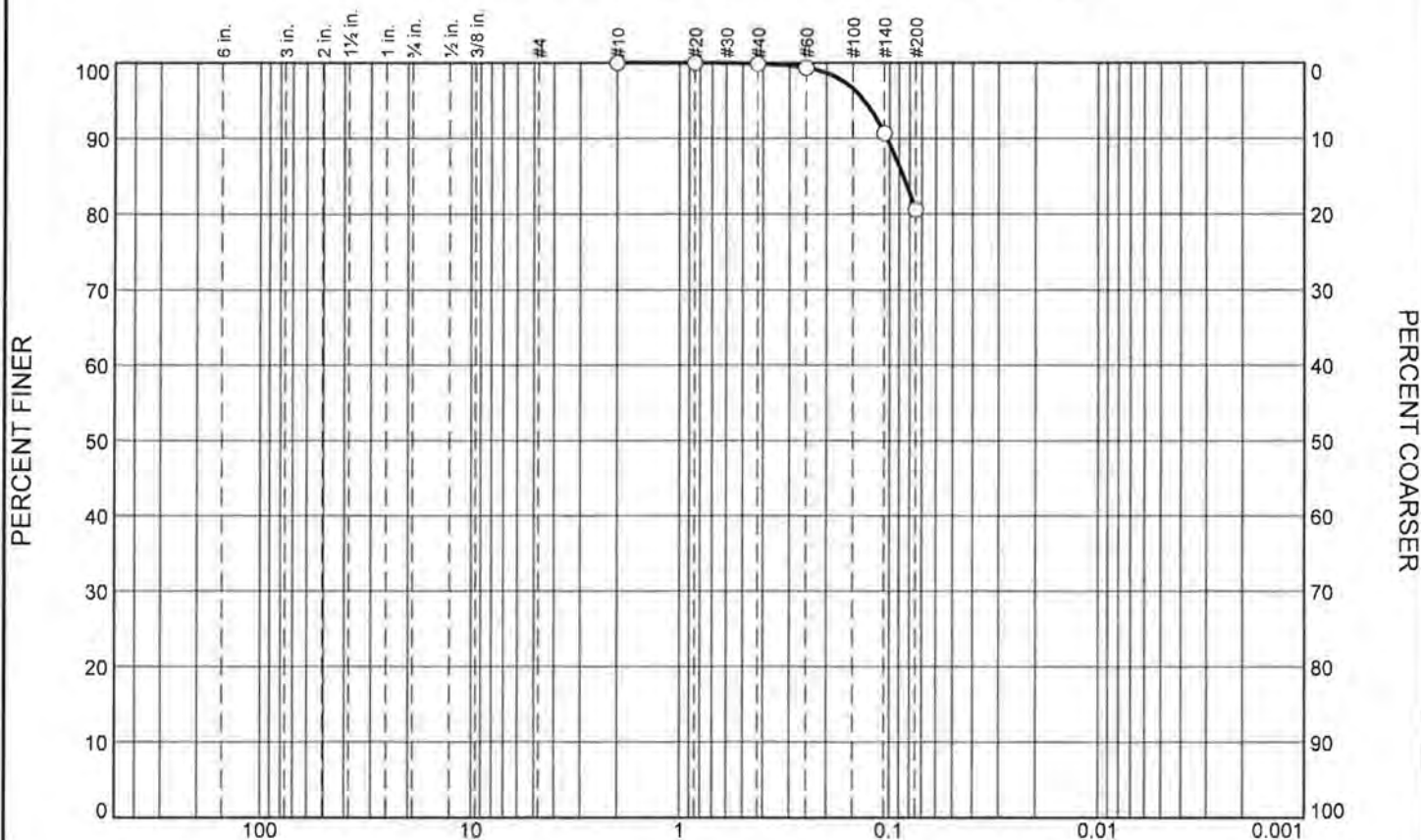


—■— 95-96.4'

Sample #	Classification	% Gravel	% Sand	% Silt	% Clay*	% Moist.	LL	PL	PI	Project:	CA HSR FRE_BAK
MC23-1	(SM) Fine Silty Sand	0	72.4	20.0	7.7	0.5					
										TES#:	23502-ZS9
										Boring#:	S0067R
										Date:	1/14/2014

* Particles smaller than 5 Micron in diameter

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	19	81	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100		
#20	100		
#40	100		
#60	99		
#140	91		
#200	81		

* (no specification provided)

Soil Description
Dark greenish gray clayey sand

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.1030 D₈₅= 0.0863 D₆₀=
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= AASHTO=

Remarks
 F.M.=0.04

Source of Sample: S0067R G-52574
Sample Number: SS24

Depth: 101.0-101.5

Date: 10/31/13

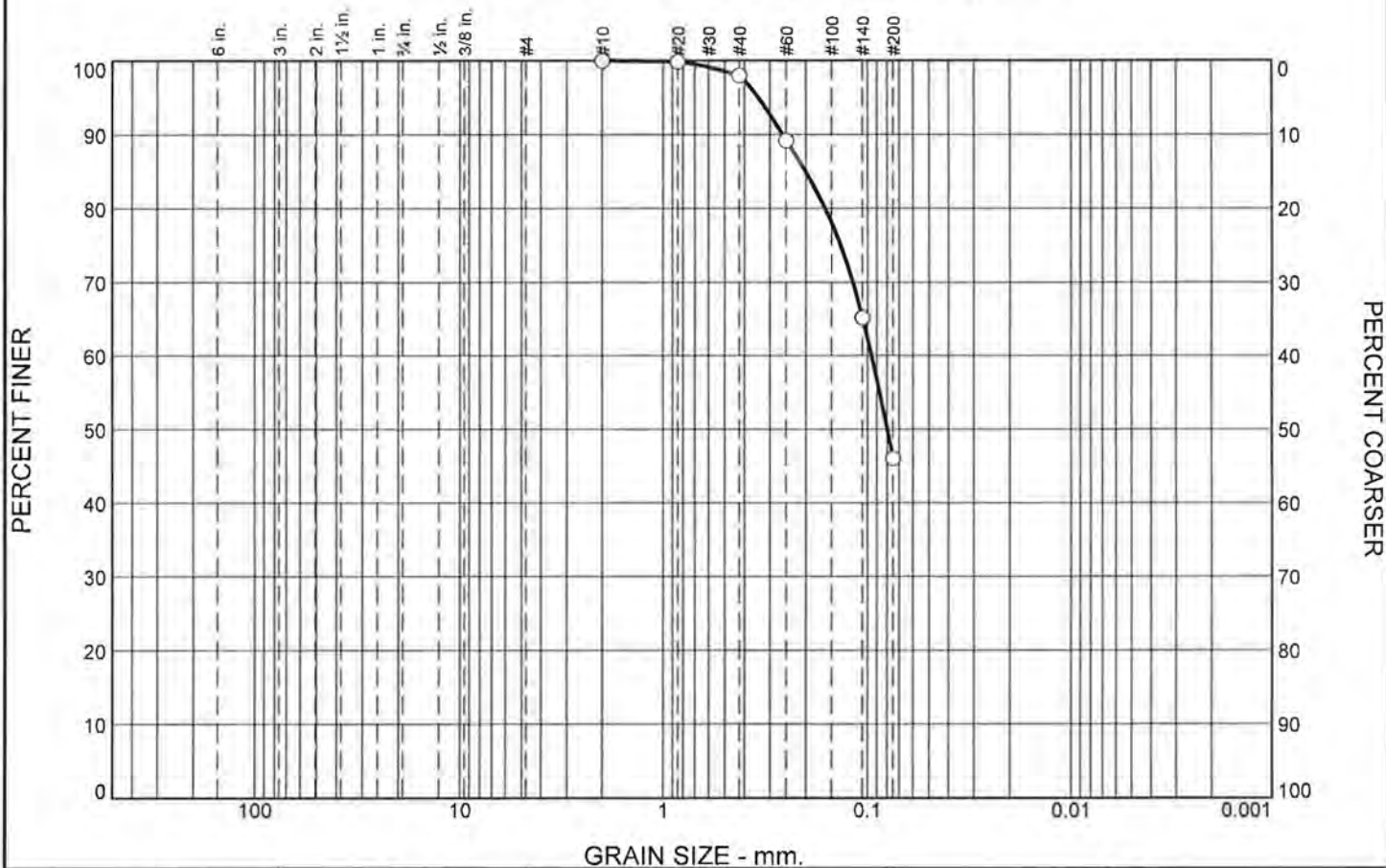


Client: URS/ARUP/HMM JV
Project: California High Speed Train

Project No: 2636-001.0

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	2	52	46	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100		
#20	100		
#40	98		
#60	89		
#140	65		
#200	46		

* (no specification provided)

Soil Description
Greenish gray silty sand

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.2608 D₈₅= 0.2014 D₆₀= 0.0957
 D₅₀= 0.0802 D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= AASHTO=

Remarks
 F.M.=0.30

Source of Sample: S0067R G-52574
Sample Number: MC26-2

Depth: 110.5-111.0

Date: 10/31/13

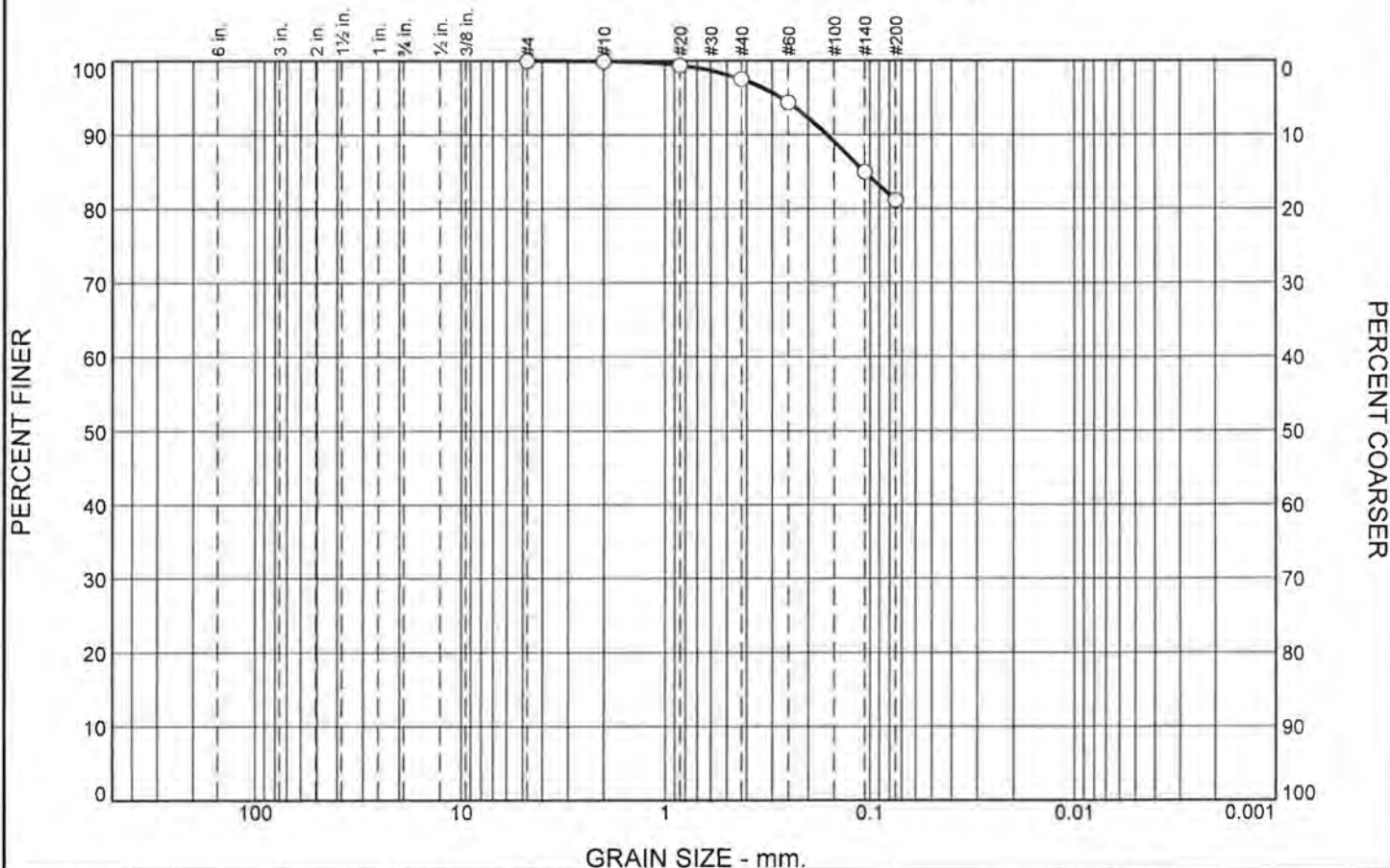


Client: URS/ARUP/HMM JV
Project: California High Speed Train

Project No: 2636-001.0

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	2	17	81	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#10	100		
#20	99		
#40	98		
#60	94		
#140	85		
#200	81		

* (no specification provided)

Soil Description
Dark greenish gray lean clay with sand

Atterberg Limits
 PL= 16 LL= 41 PI= 25

Coefficients
 D₉₀= 0.1624 D₈₅= 0.1060 D₆₀=
 D₅₀= D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= CL AASHTO= A-7-6(19)

Remarks
 F.M.=0.17

Source of Sample: S0067R G-52574
Sample Number: SS31

Depth: 136.0-136.5

Date: 10/31/13

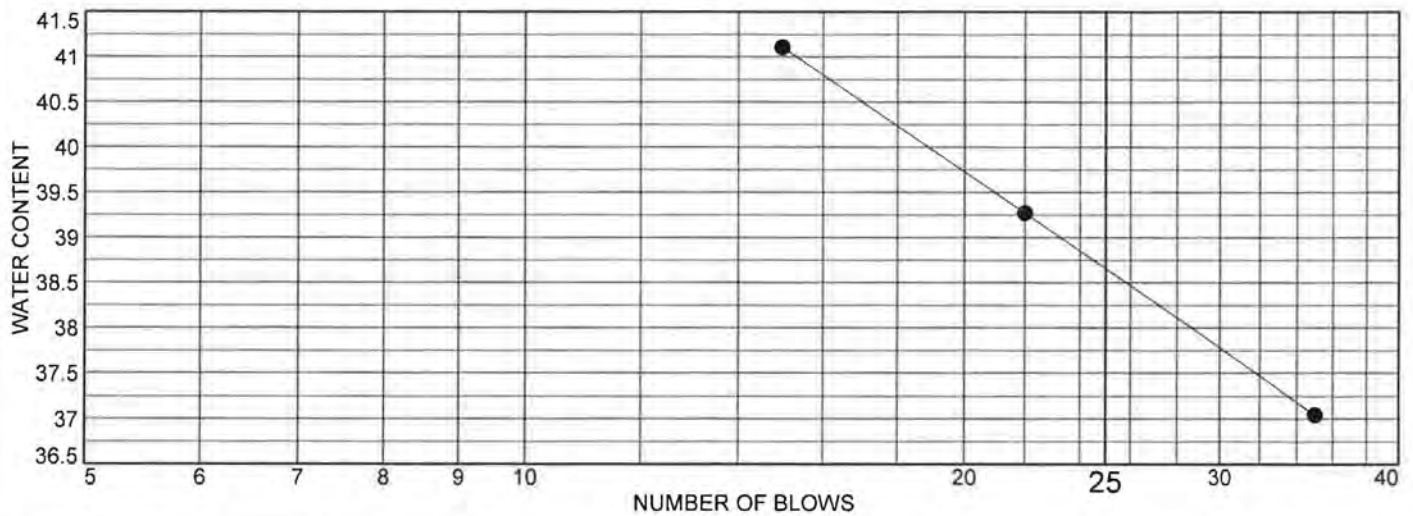
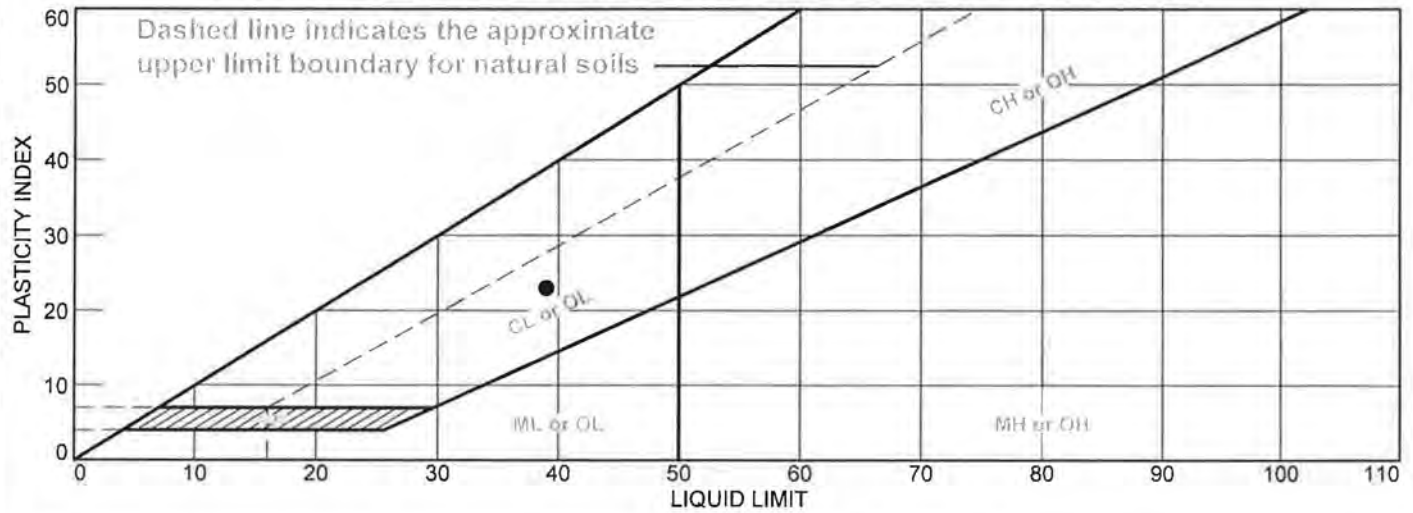


Client: URS/ARUP/HMM JV
Project: California High Speed Train

Project No: 2636-001.0

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive brown sandy clay	39	16	23			

Project No. 2636-001.0 Client: URS/ARUP/HMM JV

Project: California High Speed Train

● Source: S0067R G-52574 Depth: 15.5-16.0 Sample No.: MC04-2

Remarks:

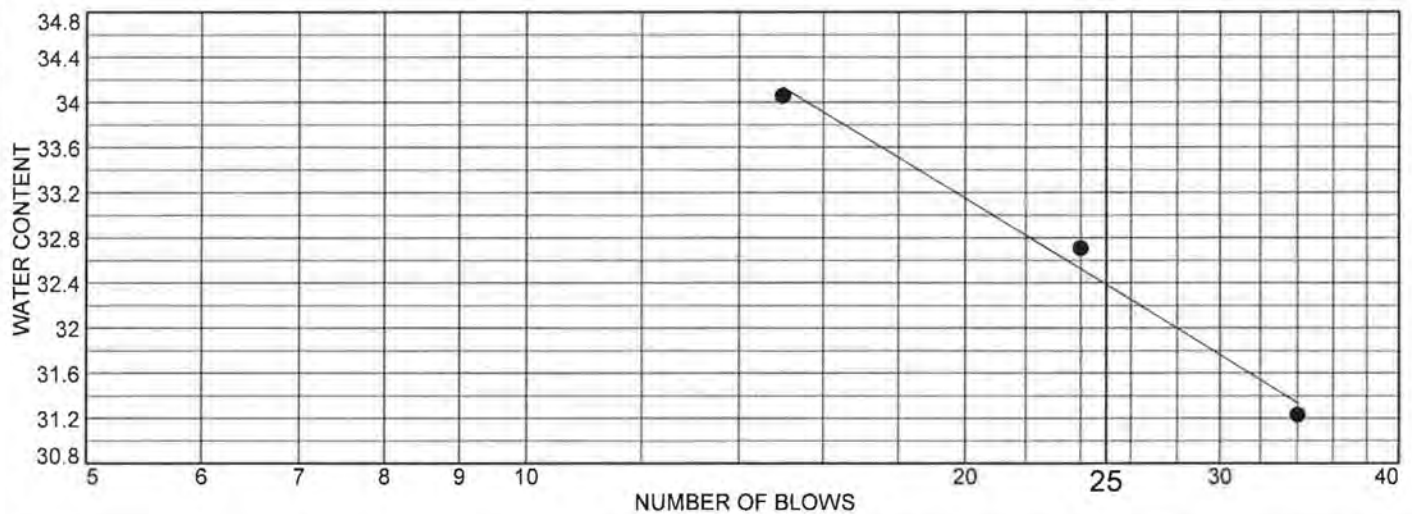
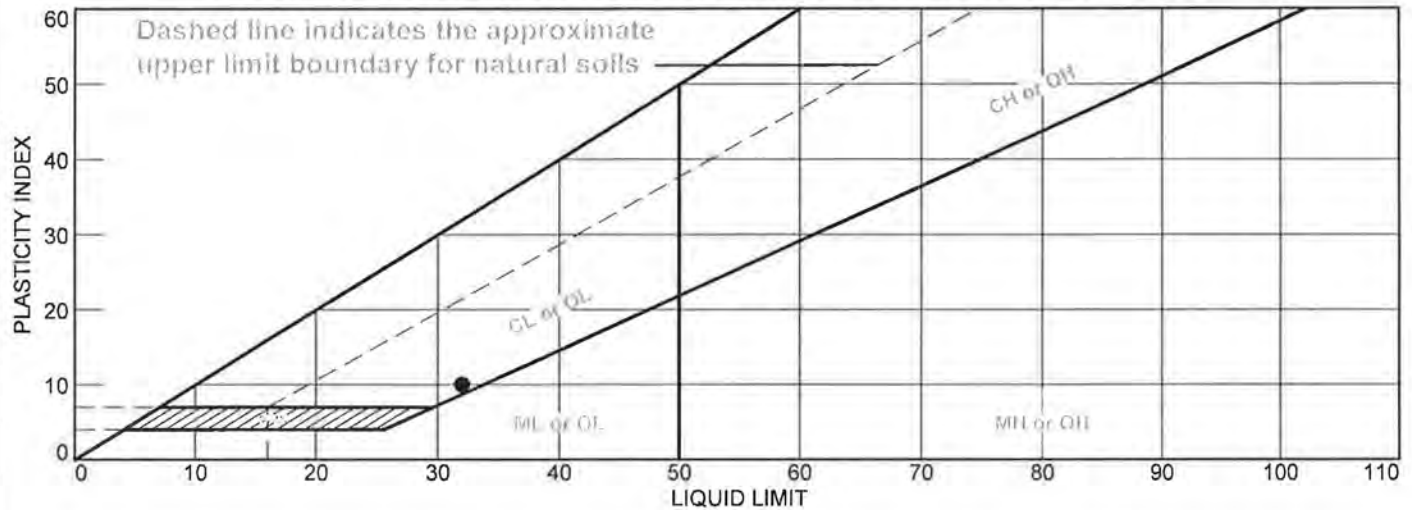


Figure

Tested By: JH

Checked By: PH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Greenish gray silty clay with sand	32	22	10	98	76	CL

Project No. 2636-001.0 Client: URS/ARUP/HMM JV

Project: California High Speed Train

● Source: S0067R G-52574 Depth: 50.5-51.0 Sample No.: MC12-2

Remarks:

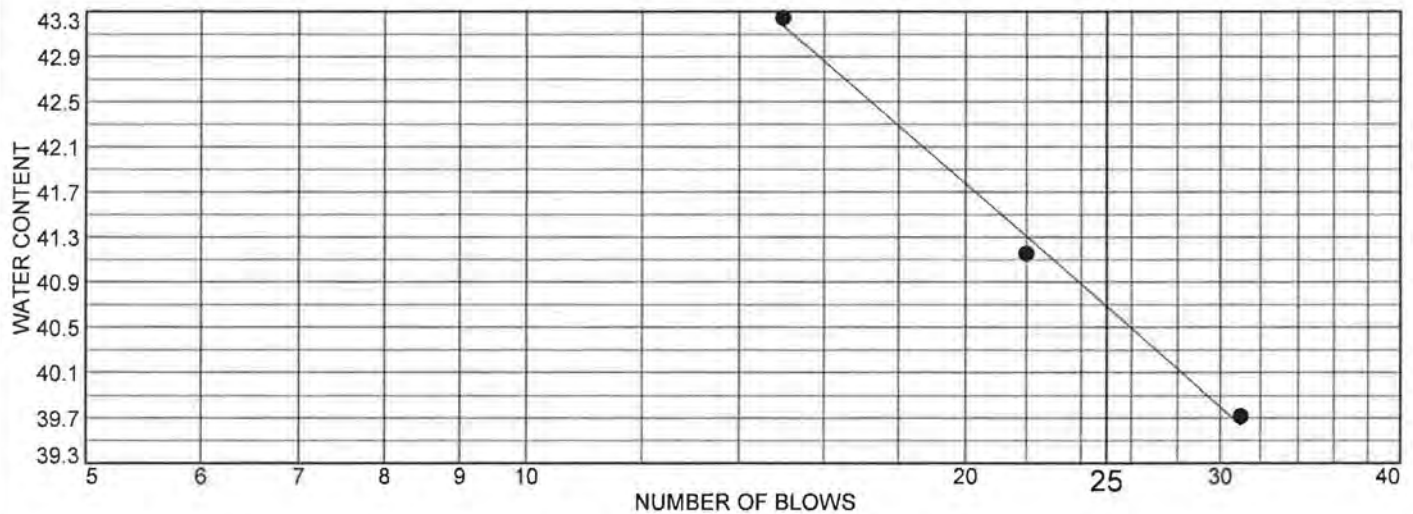
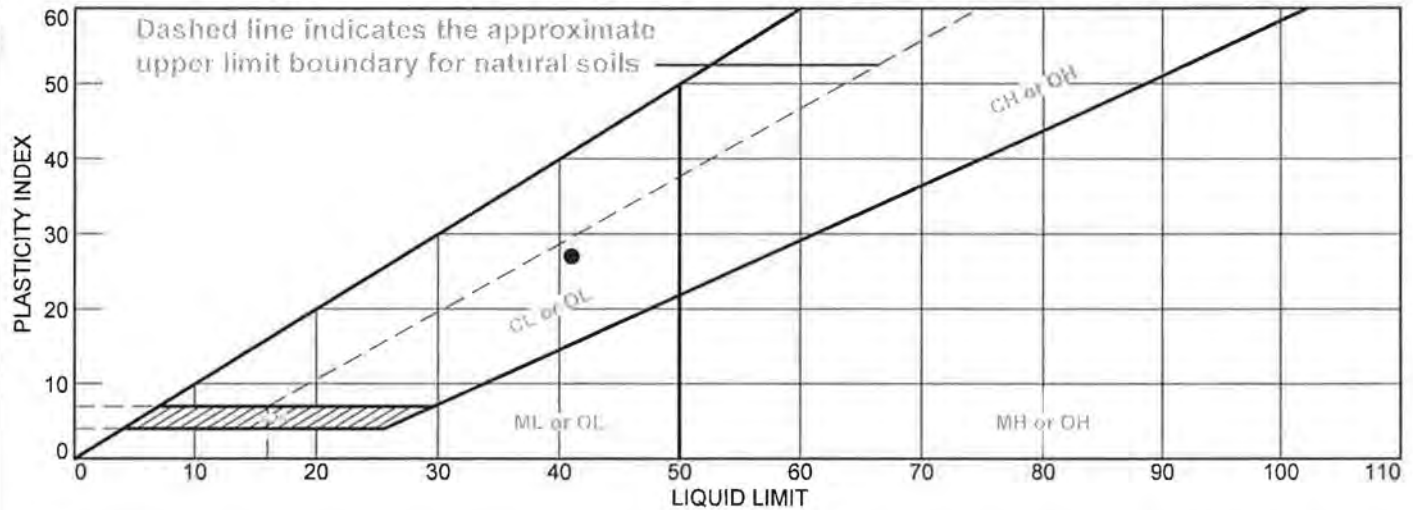


Figure

Tested By: JH

Checked By: PH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark grayish green clay	41	14	27			

Project No. 2636-001.0 Client: URS/ARUP/HMM JV

Project: California High Speed Train

● Source: S0067R G-52574 Depth: 63.5-64.5 Sample No.: U15

Remarks:

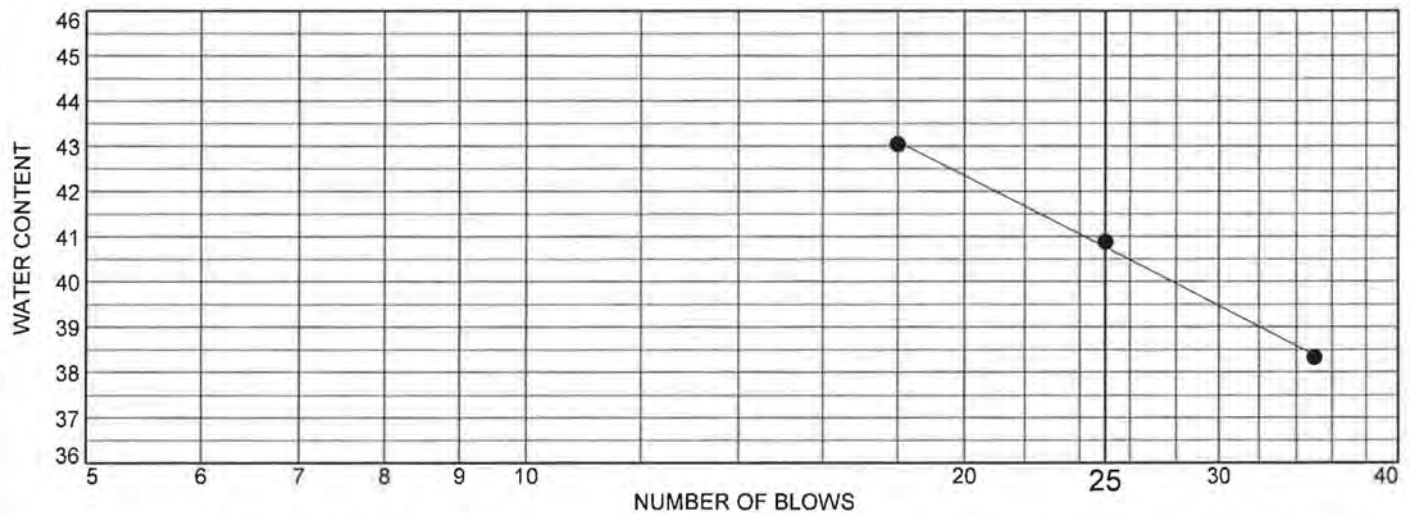
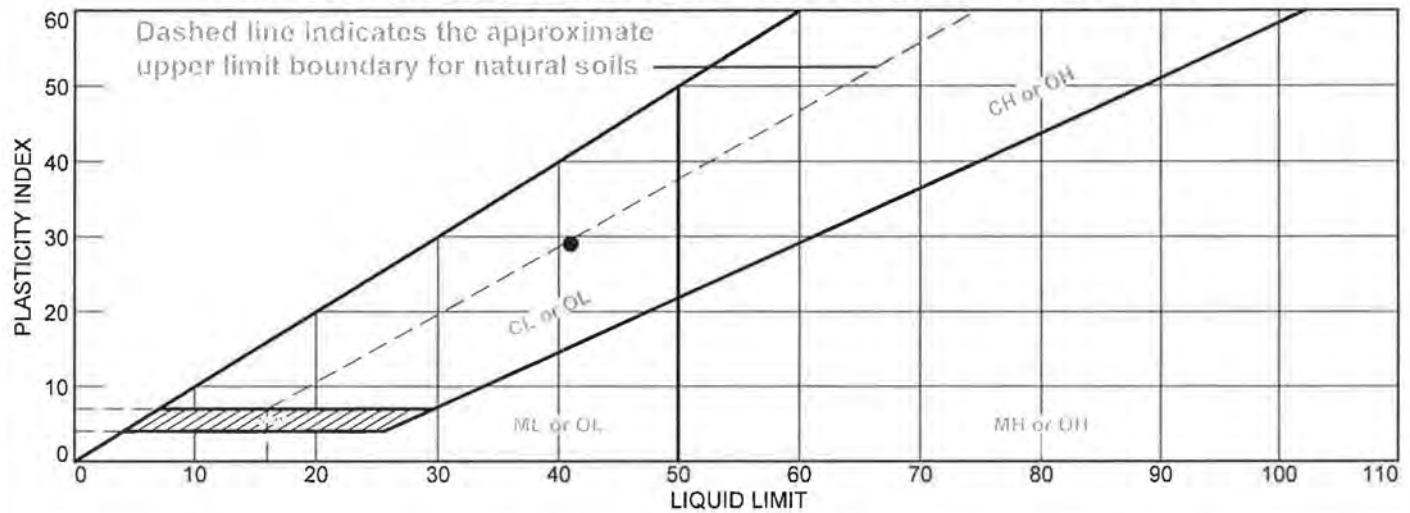


Figure

Tested By: JH

Checked By: PH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
•	Dark grayish green clay with sand	41	12	29			

Project No. 2636-001.0 Client: URS/ARUP/HMM JV

Project: California High Speed Train

• Source: S0067R G-52574 Depth: 81.0-81.5 Sample No.: SS19

Remarks:

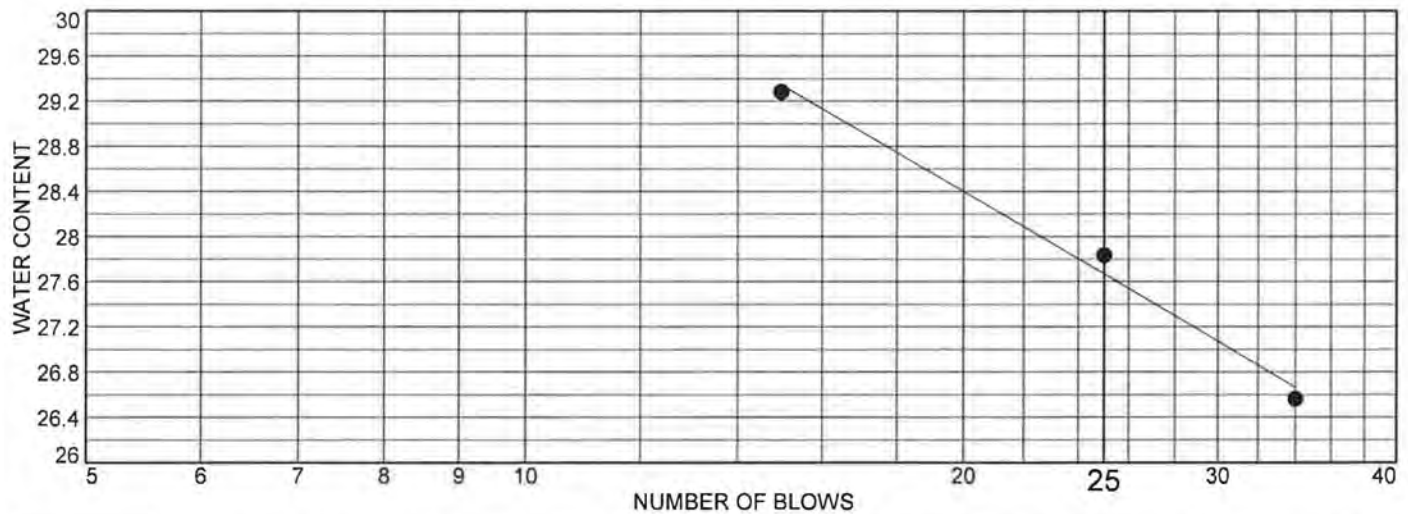
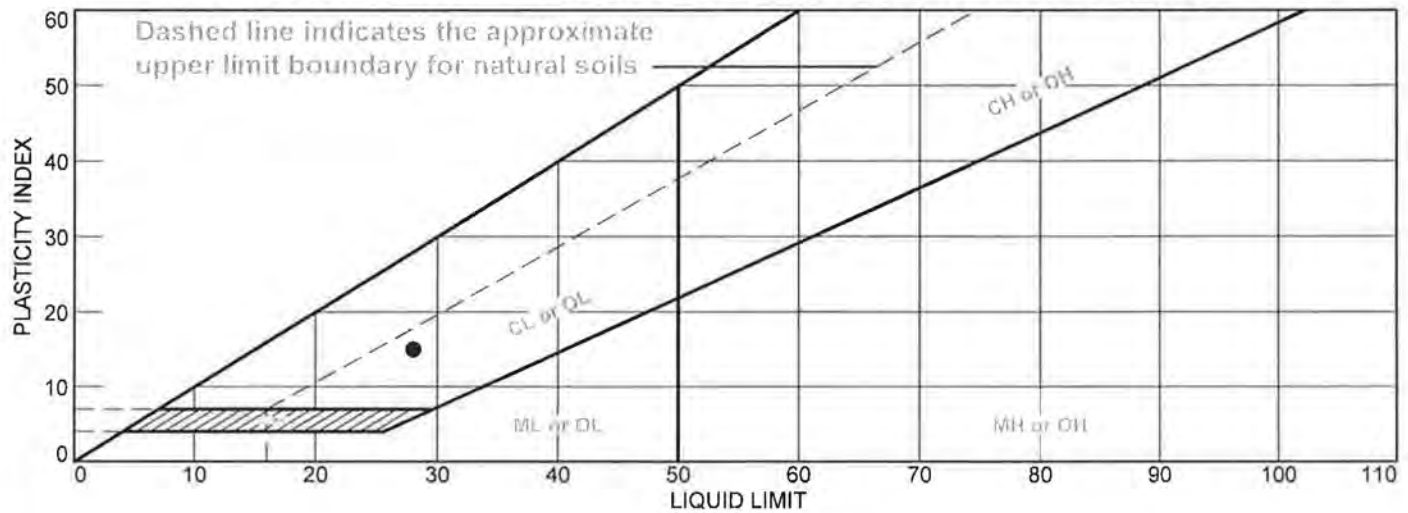


Figure

Tested By: JH

Checked By: PH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark greenish gray sandy clay	28	13	15			

Project No. 2636-001.0 Client: URS/ARUP/HMM JV

Project: California High Speed Train

● Source: S0067R G-52574 Depth: 120.9-121.4 Sample No.: MC28-2

Remarks:

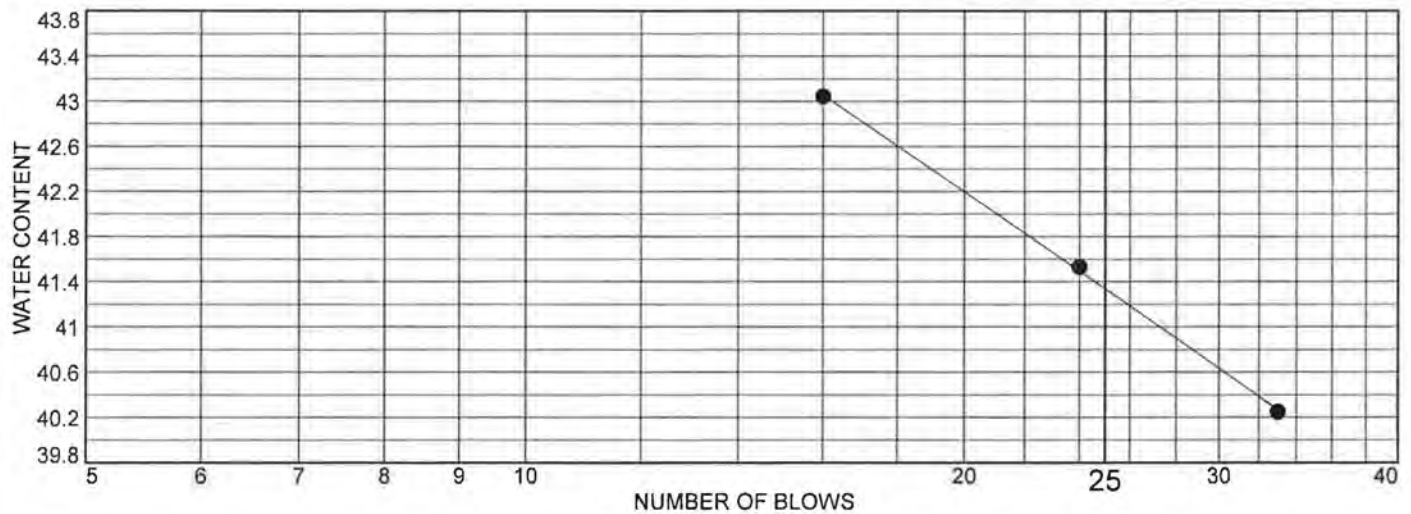
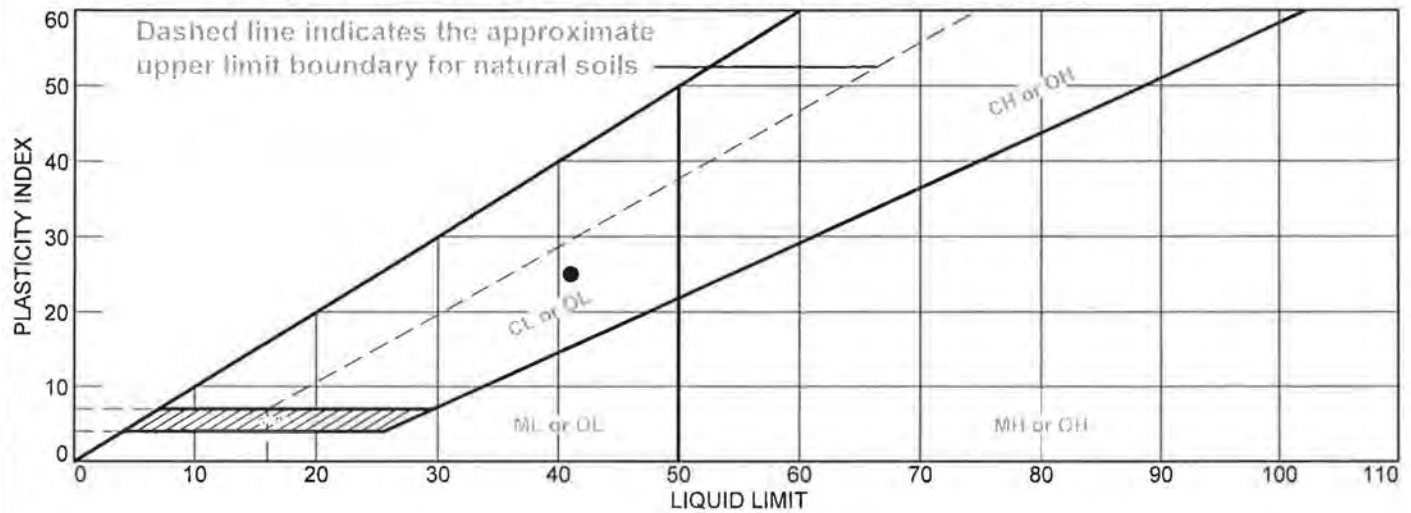


Figure

Tested By: JH

Checked By: PH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
•	Dark greenish gray lean clay with sand	41	16	25	98	81	CL

Project No. 2636-001.0 Client: URS/ARUP/HMM JV

Project: California High Speed Train

• Source: S0067R G-52574 Depth: 136.0-136.5 Sample No.: SS31

Remarks:



Figure

Tested By: JH

Checked By: PH

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS/ARUP/HMM JV
 Project : California High Speed Train
 Job # : 2636-001.0
 Boring # : S0067R
 Sample # : MC04-1
 Depth (ft) : 16
 Date tested : 10/30/13
 Soil : Olive brown sandy clay

Data Reduction:

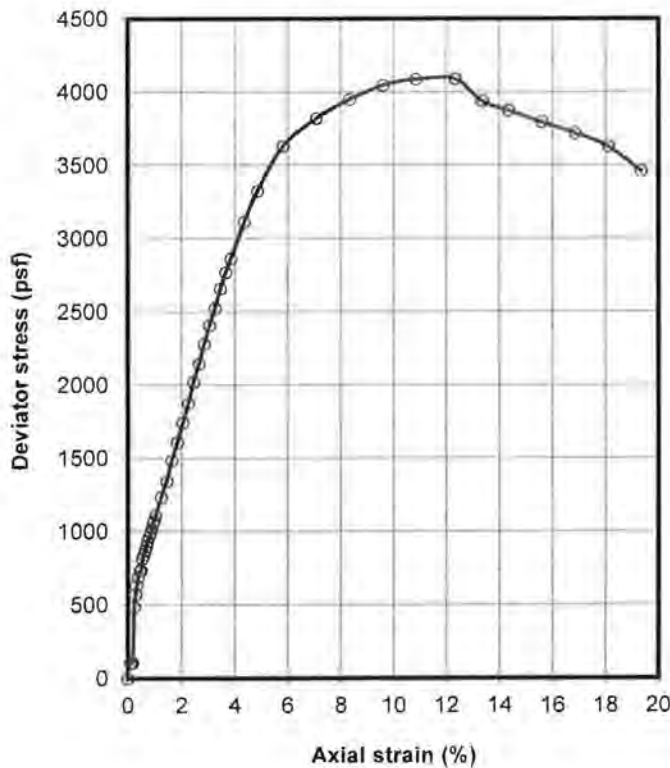
Dial factor = 1.0 in/unit
 Load factor = 1.0 lb/unit

Specimen: Total wt. = 854.5 gms
 Ht. = 5.440 in
 Ave dia. = 2.390 in
 Area = 4.488 sq.in
 Volume = 400.1 c.c.
 Shearing rate = 0.04 inch/min
 Shearing rate = 0.75 %/min
 Gs (assumed) = 2.70

Test Report:

Void ratio = 0.517
 Ht/Dia ratio = 2.28
 Moisture = 20.0 %
 Total density = 133.3 pcf
 Dry density = 111.1 pcf
 Saturation = 104.4 %
 Chamber pressure = 2880 psf
 Max. deviator stress = 4089 psf
 Strain @ failure = 12.33 %

Dial Read	Load Read	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.003	3.4	0.08	107.4
0.005	3.4	0.13	107.4
0.008	3.4	0.18	107.3
0.011	15.2	0.23	486.0
0.013	17.9	0.28	571.4
0.016	19.8	0.33	633.7
0.019	21.5	0.38	687.6
0.022	23.0	0.43	735.1
0.024	23.0	0.48	734.7
0.027	25.5	0.53	815.2
0.030	26.4	0.58	840.7
0.033	27.4	0.63	873.1
0.035	28.2	0.68	900.1
0.038	29.4	0.73	936.3
0.041	30.3	0.78	964.8
0.043	31.1	0.83	988.4
0.046	32.1	0.88	1020.1
0.049	33.3	0.93	1059.0
0.052	33.8	0.98	1074.2
0.054	34.9	1.03	1109.8
0.065	38.9	1.23	1234.2
0.076	42.5	1.44	1344.2
0.087	47.1	1.63	1485.7
0.098	51.1	1.84	1610.3
0.109	55.5	2.04	1745.2
0.120	59.7	2.24	1873.7
0.131	64.5	2.44	2019.0
0.142	68.7	2.64	2144.7
0.153	73.2	2.85	2280.9
0.164	77.4	3.04	2406.9
0.175	81.3	3.25	2524.4
0.186	85.8	3.45	2657.0
0.197	89.5	3.65	2768.1
0.208	92.7	3.85	2860.9
0.235	101.4	4.36	3112.5
0.262	108.9	4.85	3323.1
0.314	120.1	5.81	3629.6
0.383	128.1	7.07	3820.1
0.451	134.3	8.32	3949.7
0.519	139.4	9.57	4045.3
0.587	142.8	10.82	4086.7
0.669	145.4	12.33	4088.7
0.723	141.6	13.33	3937.7
0.778	141.0	14.33	3875.2
0.846	140.1	15.59	3794.7
0.914	139.4	16.84	3720.1
0.982	138.0	18.09	3627.6
1.050	133.7	19.34	3460.3



S0067R
MC04-1
16-16.5
44

1000

1000



50067R

MC04-1

16-16.5

UU

G-52574

1000

1000



50067R

MC04-1

16-16.5

UU

G-52574

1000

1000

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS/ARUP/HMM JV
 Project : California High Speed Train
 Job # : 2636-001.0
 Boring # : S0067R
 Sample # : U15
 Depth (ft) : 63.5
 Date tested : 11/04/13
 Soil : Dark grayish green clay

Data Reduction:

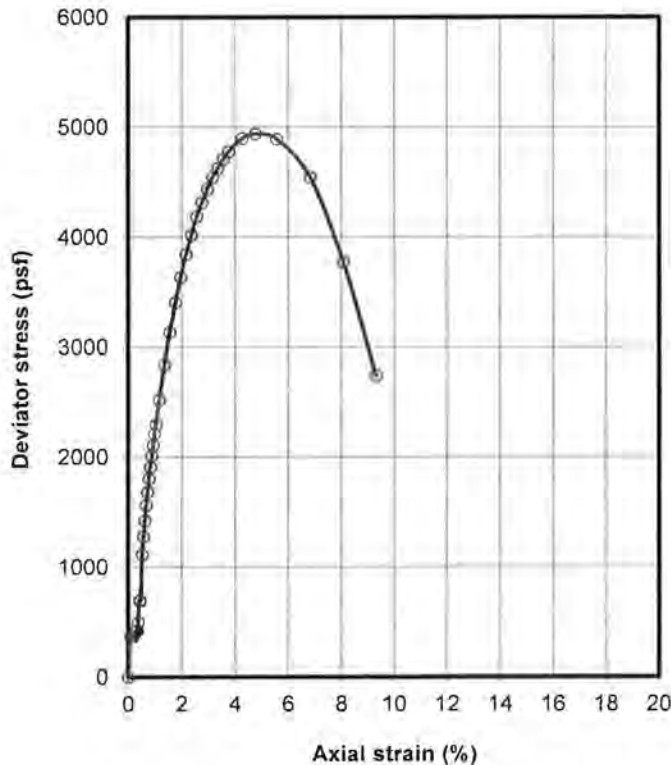
Dial factor = 1.0 in/unit
 Load factor = 1.0 lb/unit

Specimen: Total wt. = 1280.4 gms
 Ht. = 5.850 in
 Ave dia. = 2.850 in
 Area = 6.382 sq.in
 Volume = 611.8 c.c.
 Shearing rate = 0.03 inch/min
 Shearing rate = 0.5 %/min
 Gs (assumed) = 2.70

Test Report:

Void ratio = 0.578
 Ht/Dia ratio = 2.05
 Moisture = 22.3 %
 Total density = 130.6 pcf
 Dry density = 106.8 pcf
 Saturation = 104.1 %
 Chamber pressure = 11520 psf
 Max. deviator stress = 4939 psf
 Strain @ failure = 4.76 %

Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.003	16.3	0.08	366.9
0.006	16.3	0.13	366.7
0.009	16.3	0.18	366.5
0.012	18.2	0.23	410.3
0.015	18.2	0.28	408.8
0.017	18.5	0.33	417.0
0.019	22.1	0.36	497.5
0.022	30.9	0.41	693.8
0.025	30.9	0.46	693.5
0.028	49.6	0.51	1113.3
0.031	57.0	0.56	1279.9
0.034	63.6	0.61	1426.7
0.037	69.8	0.66	1565.0
0.040	75.2	0.72	1684.2
0.043	80.5	0.77	1801.4
0.046	85.3	0.82	1909.9
0.049	90.0	0.87	2014.1
0.052	94.3	0.92	2108.2
0.055	98.9	0.97	2211.0
0.058	102.9	1.02	2298.8
0.065	113.1	1.15	2522.4
0.077	127.5	1.35	2838.2
0.089	141.2	1.55	3136.7
0.101	153.5	1.75	3403.3
0.112	164.4	1.95	3636.5
0.124	174.1	2.15	3843.1
0.136	182.4	2.35	4017.7
0.148	190.4	2.55	4187.1
0.159	196.6	2.75	4314.5
0.171	202.7	2.96	4437.4
0.183	208.0	3.16	4544.7
0.194	212.1	3.36	4625.4
0.206	216.5	3.56	4711.4
0.218	220.1	3.76	4779.8
0.247	226.8	4.26	4898.5
0.277	229.8	4.76	4938.7
0.323	229.6	5.56	4892.2
0.397	216.1	6.81	4544.8
0.470	182.0	8.06	3775.9
0.543	133.8	9.31	2737.2



G-52574
S0067R
U15
63.5-64.5
TXUM

05

G-52574
S0067R
U15
63.5-64.5
TXUW

05

G-52574
S0067R
U15
63.5-64.5
TXUW

05

G-52574
S0067R
U15
63.5-64.5
TXUW

UNCONSOLIDATED UNDRAINED COMPRESSION TEST - ASTM D2850

Client : URS/ARUP/HMM JV
 Project : California High Speed Train
 Job # : 2636-001.0
 Boring # : S0067R
 Sample # : MC30-1
 Depth (ft) : 131
 Date tested : 11/03/13
 Soil : Dark grayish green sandy clay

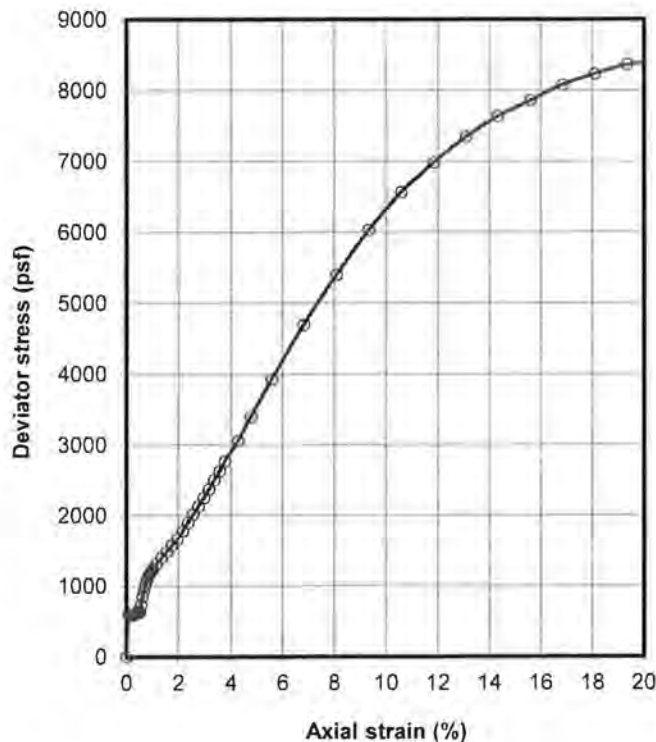
Data Reduction:

Dial factor = 1.0 in/unit
 Load factor = 1.0 lb/unit

Specimen: Total wt. = 856.9 gms
 Ht. = 5.680 in
 Ave dia. = 2.397 in
 Area = 4.513 sq.in
 Volume = 420.1 c.c.
 Shearing rate = 0.03 inch/min
 Shearing rate = 0.5 %/min
 Gs (assumed) = 2.70

Test Report: Void ratio = 0.662
 Ht/Dia ratio = 2.37
 Moisture = 25.5 %
 Total density = 127.3 pcf
 Dry density = 101.4 pcf
 Saturation = 104.2 %
 Chamber pressure = 19440 psf
 Max. deviator stress = 8383 psf
 Strain @ failure = 20.03 %

Dial Read.	Load Read.	Axial Strain (%)	Deviator Stress (psf)
-0.002		0.00	0.0
0.003	19.1	0.08	607.5
0.005	19.1	0.13	607.2
0.009	19.1	0.18	606.9
0.011	18.4	0.23	586.4
0.013	18.7	0.26	595.7
0.016	18.8	0.31	597.4
0.019	19.1	0.36	606.6
0.022	20.6	0.41	655.6
0.024	20.6	0.46	655.3
0.027	20.0	0.51	633.3
0.030	23.3	0.56	740.8
0.033	26.9	0.62	852.7
0.036	29.4	0.67	932.9
0.039	32.0	0.72	1012.4
0.042	34.0	0.77	1077.4
0.045	35.3	0.82	1118.4
0.048	36.9	0.87	1168.3
0.051	37.7	0.92	1192.7
0.053	38.8	0.97	1226.1
0.056	39.5	1.02	1246.8
0.063	41.6	1.15	1311.3
0.075	44.7	1.35	1406.7
0.086	47.4	1.55	1488.0
0.098	50.5	1.75	1581.6
0.109	53.2	1.95	1663.8
0.120	56.9	2.15	1775.7
0.132	60.9	2.35	1897.7
0.143	64.9	2.56	2017.0
0.155	68.7	2.76	2132.7
0.166	72.8	2.96	2253.8
0.178	76.7	3.16	2370.6
0.189	81.3	3.36	2506.5
0.200	85.3	3.56	2624.9
0.212	90.2	3.76	2769.3
0.240	100.1	4.27	3058.9
0.269	111.9	4.76	3399.6
0.314	130.5	5.57	3930.9
0.386	158.1	6.82	4701.8
0.456	184.1	8.07	5401.3
0.528	208.5	9.32	6033.6
0.599	230.1	10.57	6564.5
0.670	248.2	11.83	6983.7
0.741	264.8	13.08	7344.8
0.812	279.3	14.33	7635.6
0.883	291.8	15.58	7860.7
0.954	304.5	16.84	8081.0
1.026	315.1	18.09	8235.1
1.097	325.1	19.34	8366.5
1.136	328.5	20.03	8382.9



G-52574
S0067R
MC30-1.
131-131.5
TXUU

1000

1000

G-52574
S0067R
MC30-1.
131-131.5
TXuu

1000

1000

G-52574
S0067R
MC30-1.
131-131.5
TXUW

50

G-52574
S0067R
MC30-1.
131-131.5
TXUW

50

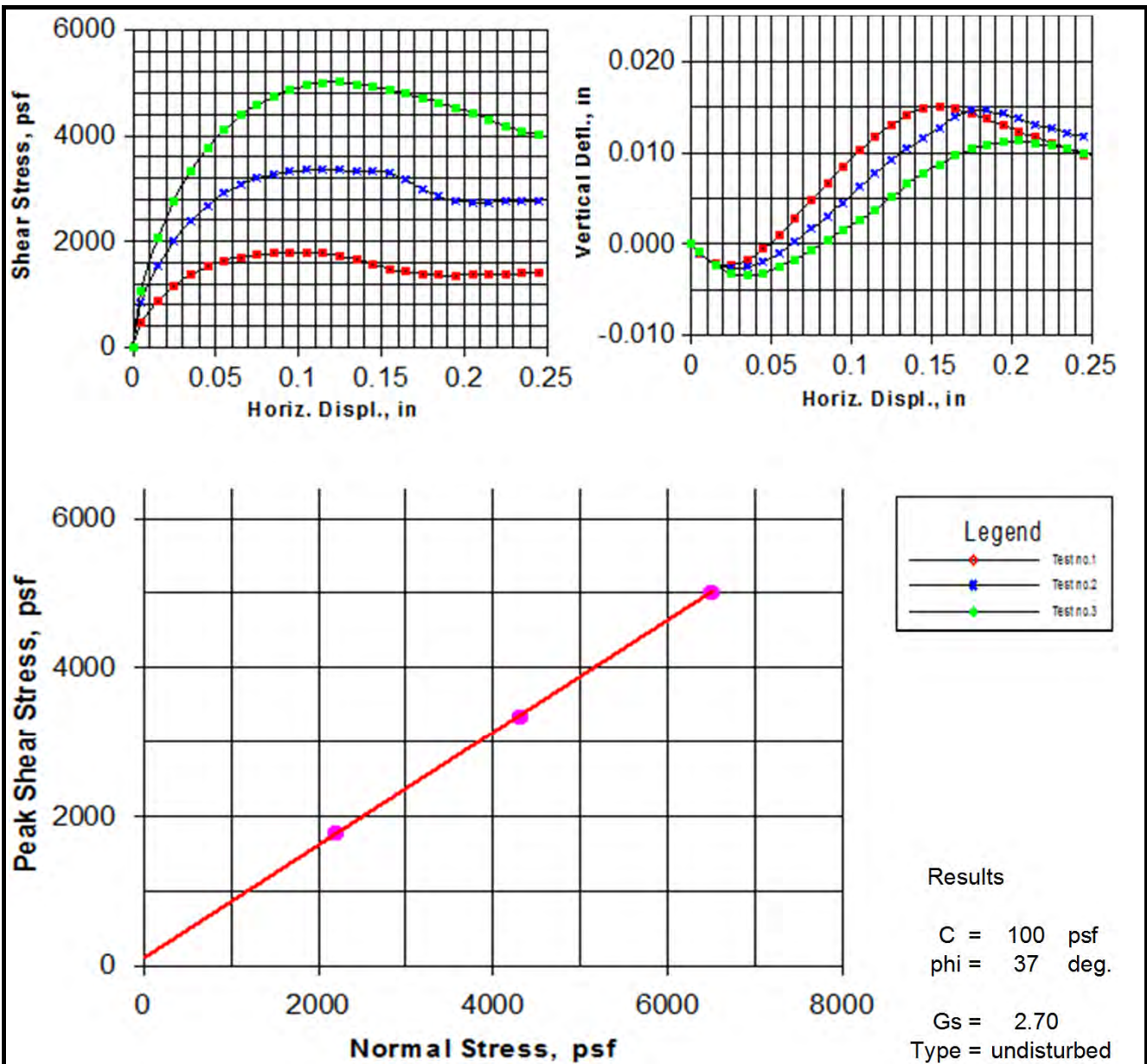
Direct Shear Moisture and Density Laboratory Results

wet density (pcf) = 115.1

dry density (pcf) = 94.3

moisture (%) = 22.1

Client: URS/ARUP/HMM JV	Boring #: S0067R	Sample #: MC5-1
Project: California High Speed Train	Depth (ft): 21-21.5	
Project #: 2636-001.0	Soil: Olive brown sand	
TEST REPORT: Direct shear - inundated, consolidated, & drained test		



Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	2200	1788	0.095	0.18	24.0	91.9	78	0.835	1.00	2.416	26.6	94.9	93	0.776	0.968
2	4300	3348	0.105	0.18	23.5	91.4	75	0.844	1.00	2.416	23.5	94.4	81	0.785	0.968
3	6500	5016	0.120	0.18	23.8	92.1	77	0.830	1.00	2.416	17.5	95.5	62	0.765	0.965

Client: URS/ARUP/HMM JV	Boring #: S0067R	Sample #: MC5-1
Project: California High Speed Train	Depth (ft): 21-21.5	
Project #: 2636-001.0	Soil: Olive brown sand	

TEST REPORT: Direct shear - inundated, consolidated, & drained test

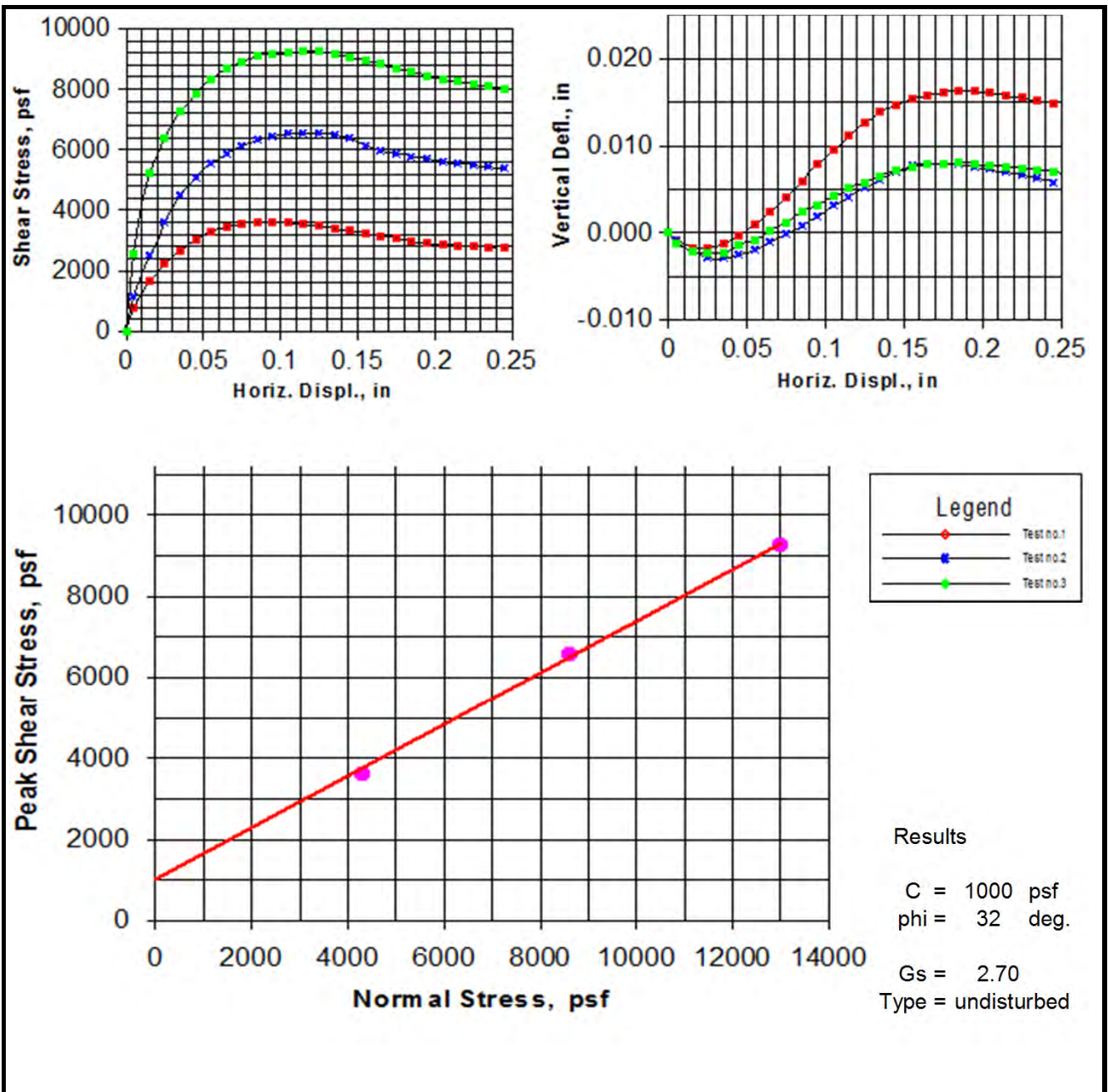
Direct Shear Moisture and Density Laboratory Results

wet density (pcf) = 132.8

dry density (pcf) = 114.6

moisture (%) = 15.9

Client: URS/ARUP/HMM JV	Boring #: S0067R	Sample #: MC 8-1
Project: California High Speed Train	Depth (ft): 36-36.5	
Project #: 2636-001.0	Soil: Grayish brown sand	
TEST REPORT: Direct shear - inundated, consolidated, & drained test		



Test no.	SigN psf	Peak Shear str., psf	Displ. in.	Strain Rate in./hr	Initial MC %	Initial DD pcf	Initial Sat. %	Initial Void Ratio	Initial Ht. in.	Initial Dia. in.	Final MC %	Final DD pcf	Final Sat. %	Final Void Ratio	Final Ht. in.
1	4300	3624	0.090	0.18	16.0	114.6	92	0.470	1.00	2.416	14.4	115.9	86	0.455	0.989
2	8600	6564	0.115	0.18	16.0	112.8	87	0.495	1.00	2.416	13.6	116.5	82	0.447	0.968
3	13000	9263	0.115	0.18	16.9	111.8	90	0.507	1.00	2.416	15.8	116.4	96	0.448	0.961

Client: URS/ARUP/HMM JV	Boring #: S0067R	Sample #: MC 8-1
Project: California High Speed Train	Depth (ft): 36-36.5	
Project #: 2636-001.0	Soil: Grayish brown sand	

TEST REPORT: Direct shear - inundated, consolidated, & drained test

COMPACTION TEST REPORT

Curve No.
52574

Test Specification:

ASTM D 1557-91 Procedure B Modified

Hammer Wt.: 10 lb.

Hammer Drop: 18 in.

Number of Layers: five

Blows per Layer: 25

Mold Size: 0.03333 cu. ft.

Test Performed on Material

Passing 3/8 in. **Sieve**

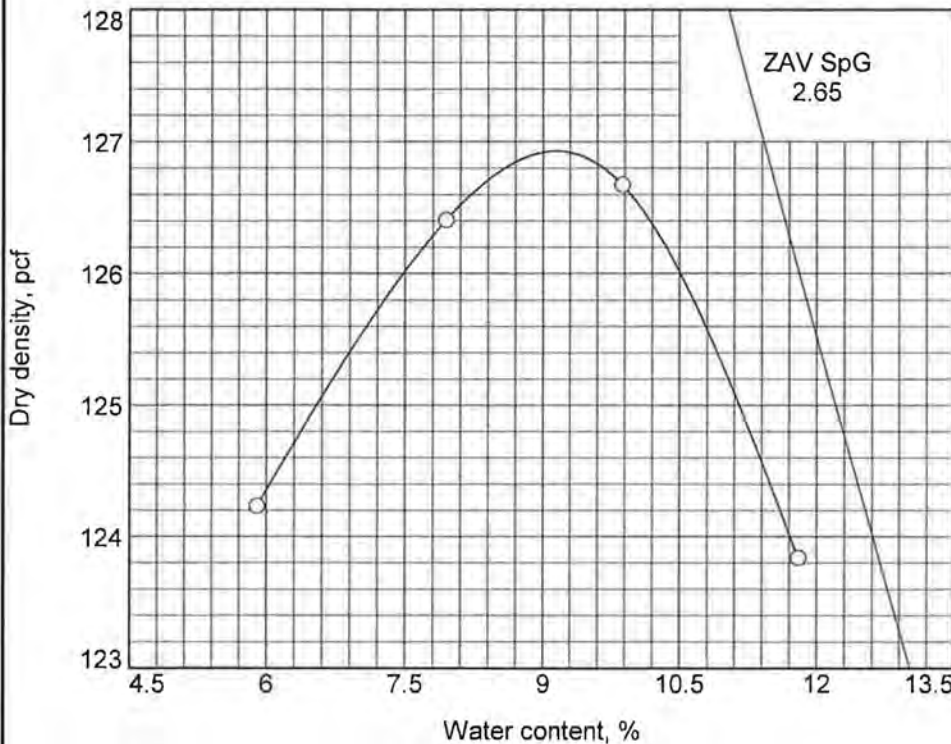
Soil Data

NM _____ **Sp.G.** _____

LL _____ **PI** _____

%>3/8 in. 2.5 **%<#200** _____

USCS _____ **AASHTO** _____



TESTING DATA

	1	2	3	4	5	6
WM + WS	6296.4	6337.9	6326.8	6222.1		
WM	4223.0	4223.0	4223.0	4223.0		
WW + T #1	661.7	659.9	671.9	621.3		
WD + T #1	613.0	600.6	601.0	586.7		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	7.9	9.9	11.8	5.9		
DRY DENSITY	126.4	126.7	123.8	124.2		

TEST RESULTS

Maximum dry density = 126.9 pcf

Optimum moisture = 9.1 %

Material Description

Gray brown sand with clay and trace of aggregate

Project No. 2636-001.0 **Client:** URS/ARUP/HMM JV

Project: California High Speed Train

Remarks:

○ **Source:** S0067R G-52574

Depth: 0-5.0

Sample No.: B-01



Figure

Tested By: LL

Checked By: LL/PH

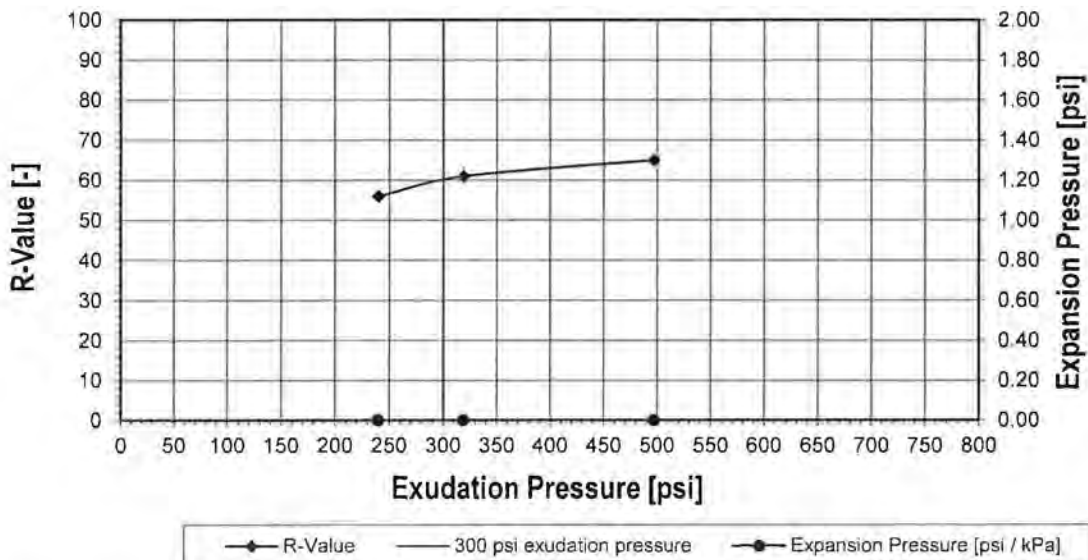
**R-Value ASTM D2844 / CT301**

Project Name: California High Speed Train
Client Name: URS/ARUP/HMM JV
Type of Material: Gray brown sand with clay and trace of aggreg
Sampling Location: S0067R
Sample No.: B-01, 0.0 to 5.0

ISI File No.: 2636-001.0
ISI Lab No.: G-52574

Test Date: 9/26/13
Run By: LL
Checked By: LL/PH

Specimen #	1		2		3	
Compaction Pressure [psi / kPa]	325	----	350	----	350	----
Total Moisture [%]	10.7		10.1		9.7	
Density[pcf]	125.5		126.5		126.9	
Expansion Pressure [psi / kPa]	0.00	0.00	0.00	0.00	0.00	0.00
Horizontal Pressure at 160 psi [psi / kPa]	44	303	38	262	35	241
Number of Turns D [-]	4.49		4.22		4.20	
Sample Height [in. / mm]	2.35	59.7	2.37	60.2	2.38	60.5
Exudation Pressure [psi / kPa]	240	1655	319	2200	497	3427
R-Value [-]	59.5		65.5		68.0	
Corrected R-Value [-]	56.0		61.0		65.0	



Corrected R-Value at 300 psi / 2.07 MPa Exudation Pressure =

60.0